



Electrochemical Impedance Spectroscopy as a Tool for PEMECs Development

Elsøe, Katrine; Hjelm, Johan; Mogensen, Mogens Bjerg

Published in:

Book of Abstracts. DTU's Sustain Conference 2015

Publication date:

2015

Document Version

Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):

Elsøe, K., Hjelm, J., & Mogensen, M. B. (2015). Electrochemical Impedance Spectroscopy as a Tool for PEMECs Development. In *Book of Abstracts. DTU's Sustain Conference 2015* [E-25] Technical University of Denmark.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Electrochemical Impedance Spectroscopy as a Tool for PEMECs Development

Katrine Elsäe^{*1}, Johan Hjelm¹, Mogens B. Mogensen¹.

1: DTU Energy

* katel@dtu.dk

Impedance spectroscopy is a widely applied electrochemical characterization method often used for characterization of energy conversion and storage devices. This PhD project is concerned with impedance spectroscopic investigations of proton conducting electrolyte membrane electrolysis cells (PEMECs) used as a tool for further development of PEMECs. The idea is to determine internal resistance of the cell from the two electrodes, the electrolyte and of mass transport limitations by analysis of differences in impedance spectra (ADIS). This method has previously been successfully demonstrated on solid oxide fuel cells (SOFCs), and the intention is to be able to transfer the method to the PEMECs, which primarily differ from the SOFCs in the electrode reaction mechanisms and the electrodes and electrolyte materials (Nielsen and Mogensen, 2011) (Jensen et al., 2007). Furthermore, physically reasonable equivalent circuit models will be used to parameterize the observed impedance, guided by information obtained from ADIS/DRT, to provide insight into performance limiting processes in the cells.

This poster gives a brief general introduction to impedance spectroscopy followed by a discussion of the ADIS procedure and the analysis method of distribution of relaxation times (DRT). Furthermore recently recorded impedance results obtained during operation of a commercial PEMEC is presented and discussed.

Acknowledgement

The work is part of the research project e-STORE funded by the Innovation Fund Denmark.

Bibliography

J. Nielsen, M. Mogensen. (2011). SOFC LSM:YSZ cathode degradation induced by moisture: An impedance spectroscopy study. *Solid State Ionics*, 189, 74-81.

S. H. Jensen, A. Hauch, P. V. Hendriksen, M. Mogensen, N. Bonanos, T. Jacobsen. (2007). A Method to Separate Process Contributions in Impedance Spectra by Variation of Test Conditions. *Journal of The Electrochemical Society*, 154 (12), B1325-B1330.